July 18, 2006 CPC

STAFF'S
REQUEST ANALYSIS
AND
RECOMMENDATION

06PR0403

Tascon Group, Inc.
(Magnolia Lakes)

Bermuda Magisterial District
Northeast quadrant of Ironbridge and Chalkley Roads

REQUEST: Approval of a water quality plan is required by Condition 5(a) of Case 04SN0314. The condition of zoning stipulates that a water quality plan, agreeable to the Chester Fishing Club and approved by the Office of Water Quality, be submitted to the Planning Commission for review and approval.

RECOMMENDATION

Staff recommends a sixty (60) day deferral of this request for the following reason:

While the Office of Water Quality staff approves the water quality proposal submitted by Balzer and Associates, Inc., the officers and members of the Chester Fishing Club are not agreeable to the plan.

GENERAL INFORMATION

Associated Public Hearing Case:

04SN0314 – Tascon Group Inc.

Developer:

Tascon Group Inc.

Location:

Fronting approximately 914 feet on the north line of Route 10 approximately 1,800 feet east of the intersection of Chalkley Road and Route 10. Tax IDs 780-653-5018, 6454 and 7185; 781-652-5796; 781-653-0770, 1911, 7245 and 9416; and 782-653-0241 (Sheet 26).

Existing Zoning and Land Use:

R-MF; Vacant

Size:

51.8 acres

Adjacent Zoning and Land Use:

North - A and R-7; Fishing pond and residential
East - A; Fishing pond
West - C-2; Vacant
South - C-2 and A; Vacant and public school

BACKGROUND

The lake is a twenty-eight (28) acre impoundment located north of Iron Bridge Road (Route 10) at the intersection of Iron Bridge and Branders Bridge Road. The lake is a private recreational resource for the Chester Fishing Club with a watershed encompassing approximately 138 acres. A 134-unit condominium development by the Tascon Group is proposed along the southwest shore of the lake. The project will encompass approximately thirty (30) acres.

One (1) of the conditions of development proffered is "*a water quality plan, including an assessment of baseline conditions, for the protection and monitoring of the water quality of the Chester Fishing Club pond and agreeable to the Chester Fishing Club, that is approved by the Office of Water Quality.*" Office of Water Quality staff met, and was in contact with, representatives from Balzer and Associates, Inc. for review and comment on the water quality plan during its development phase. A series of on-site measurements and a comprehensive set of water quality chemistries, as well as site locations and sampling timeframe, was discussed and finalized. A completed plan was submitted to the Office of Water Quality on May 16, 2006, and approved. Baseline sampling of the lake as per the plan was initiated by Balzer and Associates, Inc. on May 31, 2006.

It should be noted that the condition of zoning does not encompass approximately eighteen (18) acres of undeveloped commercial land along Route 10, which lies within the watershed area. About fifteen (15) acres of this commercial land will drain through the existing upper five (5) acre pond, which is to be converted to an SWM/BMP with the Tascon project. The remaining three (3) acres of the commercial land will drain through the proposed storm filter within the

Tascon project. In addition, all off-site commercial development within the watershed area will be required to provide separate compliance measures to meet the Chesapeake Bay Preservation Act.

METHODS and DISCUSSION

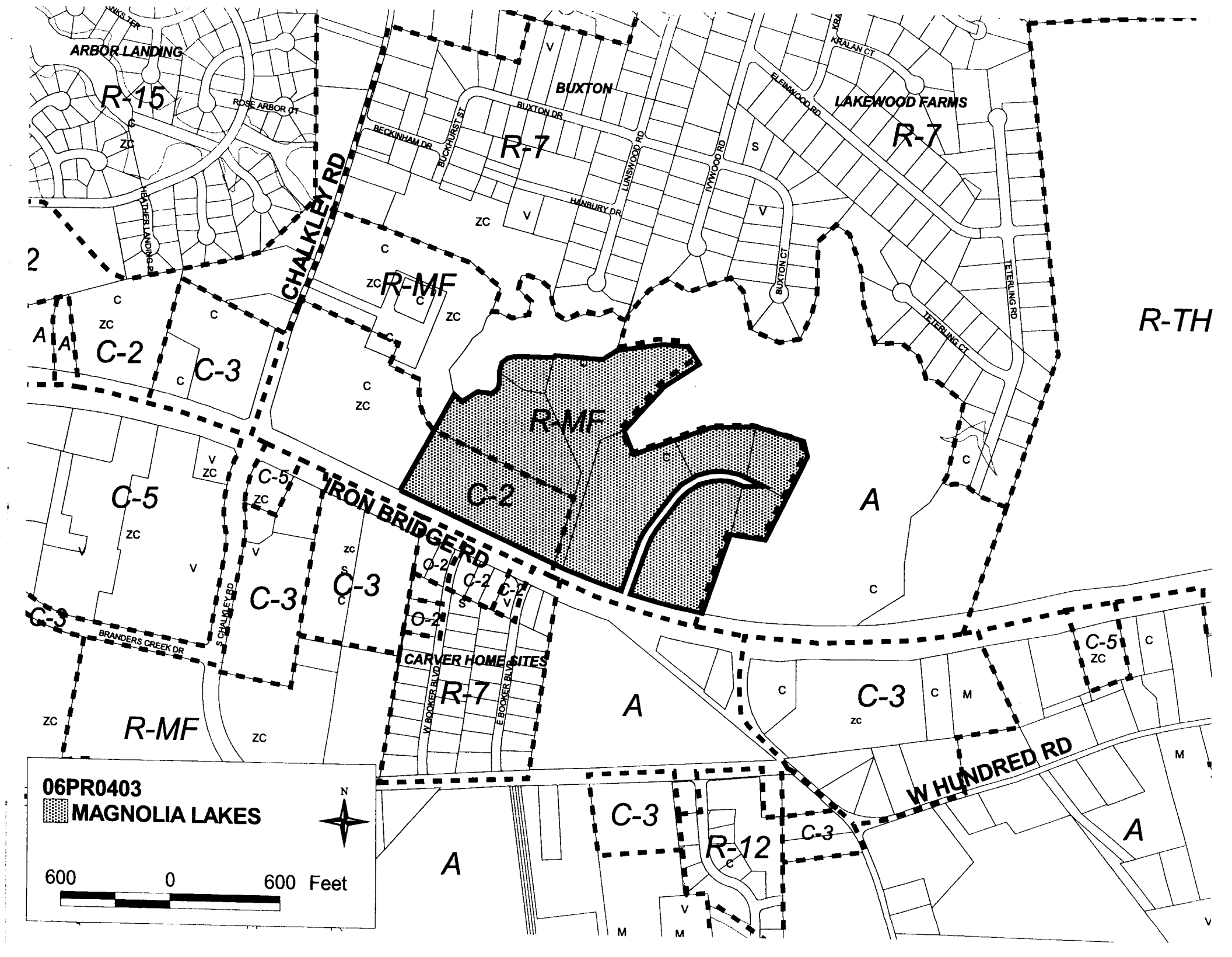
Baseline sampling for water quality is proposed at four (4) sites on the lake (Attachment 2). On-site testing will be conducted for pH, dissolved oxygen, conductivity, Secchi Disk depth and temperature. Samples for thirteen (13) constituents, including nutrients, Total Suspended Solids, turbidity, metals and fecal bacteria will be obtained and analyzed. Baseline sampling will be conducted once every two (2) weeks prior to commencement of construction. During the construction phase, sampling will occur monthly during the growing season (May-October) and once every three (3) months from November to April. Post construction sampling will occur quarterly for two (2) years. Results of all on-site and laboratory analyses will be provided to the Office of Water Quality for review.

Several permanent and temporary pollution, erosion and sediment control measures are proposed for the development. Included in the plans are three (3) temporary sediment traps, four (4) temporary sediment basins, super silt fencing adjacent to the lake and outfall protection, and turbidity curtains at the outfall locations of all adjacent temporary sediment basins. Permanent measures designed to prevent polluted stormwater runoff include upgrading an existing five (5) acre pond that feeds into the fishing lake to a BMP (Storm Water Quality Pond). Additionally, manufactured BMPs (Stormfilter and Stormceptors) will be installed to curb stormwater pollutants. Finally, flow dissipaters will be constructed to ameliorate the effects of stormflow volume to the lake.

If monitoring indicates any degradation of water quality in the Chester Fishing Club from development, the applicant will be required to provide any necessary remedies to the impact. A detailed copy of the water quality plan is on file and available for review in the Office of Water Quality.

CONCLUSIONS

The water quality protection plan outlined by Balzer and Associates, Inc. provides for continued monitoring and assessment of the lake's condition during all phases of development. Existing plans meet all the Virginia Department of Conservation and Recreation's Division of Soil and Water Conservation's requirements for erosion and sediment control. However, at the time of this report, The Chester Fishing Club does not agree with the proposed water quality plan. A meeting between the applicant and representatives of the fishing club is scheduled for the evening of July 6, 2006. If a resolution of differences cannot be made at that time, staff recommends deferral of sixty (60) days to allow for time for changes to the plan and subsequent review by the Office of Water Quality.


06PR0403
MAGNOLIA LAKES
N
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ARBOR LANDING
R-15
ROSE ARBOR CT
HEATHER LANDING PL
BUXTON
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BUXTON DR
BECKINHAM DR
BUCKHURST ST
LUNSWOOD RD
HANBURY DR
IVYWOOD RD
BUXTON CT
ELEANWOOD RD
KRALAN CT
KRA
LAKEWOOD FARMS
R-7
TETERLING RD
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R-TH
CHALKLEY RD
R-MF
C-2
C-3
C-5
A
IRON BRIDGE RD
BRANDERS CREEK DR
S CHALKLEY RD
CARVER HOME SITES
R-7
W BOOKER BLVD
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R-12
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BALZER AND ASSOCIATES INC

REFLECTING TOMORROW

WATER QUALITY PROPOSAL

FOR
TASCON GROUP, INC.
1030 OLD BON AIR ROAD
RICHMOND, VA 23235
CONTACT: STEVE SETTLEDGE

ON
POND OWNED BY CHESTER FISHING CLUB
11730 TETERLING ROAD
CHESTER, VA 23831
GPIN: 7826533923

BY
BALZER AND ASSOCIATES, INC.

PROJECT NUMBER: C0300072.00

MAY 16, 2006

PLANNERS ARCHITECTS ENGINEERS SURVEYORS
501Branchway Road Richmond, Virginia 23236 (804) 794-0571 FAX (804) 794-2635

ATTACHMENT 1
06PR0403-1

May 16, 2006

RE: Tascon- Magnolia Lakes
Chester, Virginia
Water Quality Proposal

TABLE OF CONTENTS

May 16, 2006

RE: Tascon- Magnolia Lakes
Chester, Virginia
Water Quality Proposal

Introduction:

The Chesterfield County Board of Supervisors has required the Tascon Group, Inc. to prepare a water quality plan, including an assessment of baseline conditions, for the protection and monitoring of the water quality of the Chester Fishing Club pond and agreeable to the Chester Fishing Club, that is approved by the Chesterfield Office of Water Quality. Chester Fishing Club owns the pond, and the address of the pond is 11730 Teterling Road, Chester, 23831. The address of Chester Fishing Club is P.O. Box 2961, Chester, 23831. Sections B and F of the Lakewood Farms subdivision, Teterling Court, Buxton Court, Lunswood Road, and Ivywood Road border the pond to the north. Iron Bridge Road is to the south, and the proposed Tascon-Magnolia Lakes subdivision is to the west. Teterling Road and Lakewood Farms Section F border the pond to the east. The area of the pond is 28 acres, and the outfall is through a riser pipe and earthen dam located on the easternmost side.

The pond will be tested for certain physical, chemical, and biological parameters to determine whether the fish population will suffer due to the construction west of the pond. Any major chemical or physical deviation to the pond could result in adverse effects to the current fish population. The proposed development will not be used as a commercial site; therefore more emphasis will be placed on testing for nutrients than for metals. A comprehensive suite of chemical parameters will be collected including, but not limited to, measurements of dissolved oxygen, conductivity, pH, and alkalinity. Some physical parameters to be measured include fecal coliform and total suspended solids. The variables tested have been decided upon by collaboration with Chesterfield County Environmental Engineering. All measurements taken will be evaluated by Balzer and Associates, Inc. or by Air, Water, and Soil Laboratories, Inc. to ensure that the parameters fall within Virginia state water quality standards and normally expected ranges. Quality assurance and quality control will be guaranteed by using appropriate documentation and analytical methods. When using data, Balzer and Associates, Inc. will assure that the data sets were created using appropriate laboratory methods. Any differences in laboratory methods will be noted and appropriately considered during the statistical analysis.

Executive Summary:

The required water quality tests are to be performed in the epilimnion of the water column. This is the upper layer of water in a thermally stratified lake. The epilimnion consists of the warmest water and has a fairly uniform temperature. The layer is readily mixed by wind action.

The testing will also be performed during all seasons of the year, due to variations in the parameters tested from month to month. Ponds and other bodies water display seasonal cycles. Temperature and sunlight amount are two of the main driving forces that affect changes in the parameters being tested. The most noticeable variation will be change in temperature of the water. Temperature varies both seasonally and throughout the day. Collecting water at the same time each day and in the same seasons from year to year is important for consistency among readings. Temperature changes throughout the year are a precursor to dissolved oxygen level changes from season to season. Colder water can hold more dissolved oxygen than

warmer water. Photosynthesis occurs at its highest levels during the growing season. When photosynthesis occurs, more dissolved oxygen is being put into the water, and when decomposition of aquatic plants occurs, oxygen is being used up. Higher concentrations of chlorophyll a are common during the summer months when water temperatures and light levels are high because these conditions lead to greater phytoplankton numbers. It is common for Secchi disk depth measurements to get shallower during the summer season because of increased abundance of free floating algae.

PH is the first parameter to be tested by Balzer and Associates, Inc. Water contains both hydrogen ions and hydroxyl ions. pH is measured on a scale that ranges from 0-14. Pure, deionized water contains equal numbers of these two ions and is considered neutral, a pH of 7. If the sample being measured has more hydrogen ions than hydroxyl ions, it is considered acidic and has a pH less than 7. If the sample contains more hydroxyl ions, it is considered basic and has a pH greater than 7. pH is measured on a logarithmic scale. For every one unit of change on the pH scale, there is approximately a ten-fold change in the acidity or alkalinity of the sample. Most aquatic organisms can survive only in a limited range of pH values. Dramatic

changes in pH can affect the survival of many organisms. At extremely high or low pH values that water becomes unsuitable for most organisms. In Virginia, the pH of most surface waters ranges between 6 and 9. pH may fluctuate due to natural events, but humans can also cause unnatural fluctuations in pH. Runoff from abandoned mines can significantly lower the pH of nearby waters. Heavy automobile traffic can also result in fluctuations in this parameter. pH is a strong determinant of the solubility and availability of both nutrients and pollutants. pH values tend to be lower in the winter as compared to the summer, and lower in the bottom waters as compared to the surface waters.

Balzer and Associates, Inc. will also take readings on temperature variations in the pond. Cold water can hold more oxygen than warm water because gases, like oxygen, are more easily dissolved in cold water. Measuring water temperature is important because temperature affects the amount of oxygen that can be dissolved in water, the rate of photosynthesis of algae and other aquatic plants, the rates of growth, decomposition of aquatic life, and the sensitivity of organisms to toxic wastes, parasites, and diseases. Temperature varies both seasonally and throughout the day. Because of this, collecting water samples at the same time each day and in the same season throughout the year is important for consistency among readings. Water temperature can be influenced by both natural causes and by human-related pollution. Some things that can influence water temperature include summer urban runoff, point sources of pollution, shading, groundwater flow, soil temperature, ambient air temperature, and pond orientation.

Conductivity is the third parameter to be measured by Balzer and Associates, Inc. Specific conductance is a measure of how well water can pass an electrical current. It is an indirect measure of the presence of inorganic dissolved solids, such as chloride, nitrate, sulfate, phosphate, sodium, magnesium, calcium, and iron. These substances conduct electricity because they are negatively or positively chard when dissolved in water. The concentration of dissolved solids can be affected by human influences. Agricultural runoff can raise conductivity due to the presence of phosphate and nitrate.

The fourth parameter to be measured by Balzer and Associates, Inc. is dissolved oxygen levels. Oxygen dissolves in water, but in water it is found in much lower concentrations than in air. Aquatic organisms such as fish, insects, and algae need oxygen to survive. The concentration of dissolved oxygen changes throughout the day and throughout the year. This is due to temperature changes, photosynthesis, and decomposition. Temperature changes the amount of oxygen that water can hold, photosynthesis puts oxygen into the water, and decomposition uses oxygen. It is important to measure dissolved oxygen at the same time each day for consistency among readings. Oxygen is most likely to be low during the pre-dawn hours because photosynthesis is not occurring and oxygen has been consumed by decomposition and respiration. Some forms of pollution can lower dissolved oxygen levels. Adding nutrients to water may stimulate the growth of plants. When these plants start to decompose, the process of decomposition consumes oxygen. Therefore, excess nutrients such as nitrogen and phosphorus can result in lowered dissolved oxygen levels, which in turn can be detrimental to certain aquatic species. Human activities that affect dissolved oxygen levels include the removal of riparian vegetation, runoff from roads, and sewage discharge. Dissolved oxygen levels are expressed in milligrams of oxygen per liter of water. Healthy water bodies usually have dissolved oxygen levels of around eight milligrams per liter. Higher levels of dissolved oxygen should be noticed during the colder months of the year. The colder the water, the more oxygen can be dissolved.

The last measurement to be taken by Balzer and Associates, Inc. is the secchi disk depth reading. A Secchi Disk measures water clarity, and it is an approximate evaluation of the transparency of water. Water clarity may be affected by several different factors: algae, sediment, eyesight of the viewer, the time of day readings are taken, the reflectance of the disk, and/or water color. A reading is determined by the naked eye viewing an eight-inch diameter metal disk painted in alternate black and white quadrants lowered into the water column until it disappears from view. The depth of the water where the disk vanishes and reappears is the Secchi disk reading. The depth level reading on the tape at the surface level of the lake is recorded to the nearest foot. A Secchi disk reading can generally be placed into three respective categories: less than four feet is a poor reading, 4-15 feet is good, and greater than 15 feet is excellent. The most valuable information from Secchi disk data is a graph that shows weekly or monthly changes over a period of years to show if the lake's water quality is remaining constant, improving or degrading. Some of the reports for any one season may show an increased water transparency depth after the first week of spring. This may be due to reduced nutrient input from the watershed, increased grazing of algae by zooplankton, reduced soil erosion into the lake, or seasonal algae succession. If the Secchi disk transparency depths are getting shallower during the summer season, it may be due to increased abundance of free floating algae, erosion of the shoreline or erosion from site development near the lake, recirculation of bottom sediment from motorboat activity, discoloration of the water from wetlands runoff and/or plant decomposition, increased turbidity, or reduced zooplankton populations. Significant storm events within the watershed with the resultant stormwater runoff, or possible decreases in zooplankton population drop-offs reducing the grazing of algae could also result in reduced Secchi disk readings. When Secchi disk depths become shallower, this may be due to an increase in biomass formation, which implies increases nutrient delivery, which parallels an increase in nitrate and phosphorus loads.

Balzer and Associates, Inc. will also be collecting water samples to be tested by Air Water and Soil Laboratories, Inc. The parameters tested by this lab include Total Suspended Solids, Turbidity, Lead by ICP, Copper by GFAA, Nitrite, Nitrate, Alkalinity, Ammonia, TKN, Phosphorus (Total and Ortho), Chlorophyll A, and Fecal Coliform.

Total Suspended Solids are solids in water that can be trapped by a filter. The suspended solids can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage. High concentrations can cause many problems for pond health and aquatic life. A high amount of total suspended solids can block light from reaching submerged vegetation. As the amount of light passing through the water is reduced, photosynthesis slows down. Reduced rates of photosynthesis causes less dissolved oxygen to be released into the water by plants. If light is completely blocked from bottom dwelling plants, the plants will stop producing oxygen and will die. As the plants are decomposed, bacteria will use up even more oxygen from the water. Low dissolved oxygen can lead to fish kills. High amounts of total suspended solids can also cause an increase in surface water temperature, because the suspended particles absorb heat from sunlight. This can cause dissolved oxygen levels to fall even further because warmer water hold less dissolved oxygen. Suspended sediment can also clog fish gills, reduce growth rates, decrease resistance to disease, and prevent egg and larval development. When suspended solids settle to the bottom of the pond, they can smother the eggs of fish and aquatic insects, as well as suffocate newly hatched insect larvae. High amounts of total suspended solids can often mean higher concentrations of bacteria, nutrients, pesticides, and metals in the water. These pollutants may attach to sediment particles on the land and be carried into water bodies with storm water.

There are several factors that can affect the amount of total suspended solids. The flow rate of a water body that outfalls into the pond is a primary factor in the amount of these suspended solids. Heavy rains can pick up sand, silt, clay, and organic particles such as leaves, soil, or tire particles from the land and carry them to surface water. A change in flow rate can also affect the amount of suspended solids. If the speed or direction of the water current increases, particulate matter from bottom sediments may be resuspended. Soil erosion can be a factor as well. This can be caused by building and road construction and logging. The eroded soil particles can be carried by stormwater to surface water, thus increasing the suspended solids in a water body. During storm events, soil particles and debris from streets and industrial, commercial, and residential areas can be washed into streams. Because of the large amount of pavement in urban areas, infiltration is decreased, velocity increases, and natural settling areas have been removed. Sediment is carried through storm drains directly to water bodies that can flow into the pond.

Turbidity is a parameter that measures the water clarity and tells how much the material suspended in water decreases the passage of light through the water. Turbidity is closely related to total suspended solids, but also includes plankton and other organisms. Suspended materials include soil particles (clay, silt, and sand) algae, plankton, microbes, and other substances. These materials are typically in the size range of .004 mm to 1.0 mm. Higher turbidity increases water temperatures because suspended particles absorb more heat. This reduces the concentration of dissolved oxygen. Higher turbidity also reduces the amount of light penetrating the water, which reduces photosynthesis and the production of dissolved oxygen.

Sources of turbidity include soil erosion, urban runoff, and excessive algal growth, and high flow rates. Storm events can also increase the turbidity of a water body. Therefore, sampling will occur 48-72 hours after a storm event to get a more accurate reading of turbidity under normal circumstances.

Chlorophyll a is a green pigment found in plants, and the measurement is used to estimate the total biomass of planktonic algae in the lake. Chlorophyll a absorbs sunlight and converts it to sugar during photosynthesis. High levels of chlorophyll a often indicate poor water quality and low levels suggest good conditions. Elevated chlorophyll a concentrations are not necessarily bad, but it is the long-term persistence of elevated levels that is a problem. It is natural for the levels to fluctuate over time. Concentrations are often higher after rainfall, particularly if the rain has flushed nutrients into the water. Higher levels are also common during the summer months when water temperatures and light levels are high because these conditions lead to greater phytoplankton numbers.

TKN, or Total Kjeldahl Nitrogen, is the sum of organic nitrogen and ammonia in a water body. Organic nitrogen may be either dissolved or suspended particulate matter in water. The sample is measured in milligrams per liter. High measurements of TKN typically result from sewage and manure discharges to water bodies and/or decaying organic matter.

Alkalinity refers to the buffering capacity of water. Alkalinity measures the amount of alkaline compounds in water, such as carbonates, bicarbonates, and hydroxides. These compounds are natural buffers that can remove excess hydrogen ions that have been added from sources such as acid rain or acid mine drainage. Measuring alkalinity is important in determining a water body's ability to neutralize acidic pollution from rainfall or wastewater. Alkalinity does not refer to pH, but instead refers to the ability of water to resist change in pH. The presence of buffering materials help neutralize acids as they are added to the water. Waters with low alkalinity are very susceptible to changes in pH. Waters with high alkalinity are able to resist major shifts in pH. As increasing amounts of acid are added to a water body, the pH of the water decreases, and the buffering capacity of the water is consumed. A solution having a pH below 4.5 contains no alkalinity, because there are no carbonate or bicarbonate ions left. Because alkalinity and pH are so closely related, changes in pH can also affect alkalinity, especially in a poorly buffered body of water. Alkalinity can also mitigate for the metals' toxicity by using available carbonates to take metals out of solution, thus making it unavailable to fish. Because alkalinity varies greatly due to differences in geology, there are not general standards for it.

Coliform bacteria are normal inhabitants of the digestive tract of warm-blooded animals and are shed from the body in fecal material. The predominant fecal coliform is Escherichia coli, which comprises a large portion of the human intestinal bacterial population. It is not feasible to try to detect all harmful microorganisms in surface water samples. Therefore, an indicator organism is used to determine the presence of disease-causing bacteria. Escherichia coli is the indicator organism most commonly used for the fecal coliform analysis. Contamination with untreated wastewater can also increase the concentration of nitrate in ground and surface waters. Increased levels of nitrate in surface waters can enhance the growth of aquatic plants and algae. When these plants begin to decompose, the process can greatly reduce oxygen

levels in the water, which affects populations of fish and aquatic insects. Surface water may become contaminated with coliform bacteria from a variety of point and non-point sources of pollution, including agricultural runoff, sewage discharge, urban runoff, septic tank failure, and industrial effluents. If a large number of fecal coliform bacteria (over 200 colinies/100ml of water sample) are found in water, it is possible that pathogenic organisms are also present in the water.

Eutrophication is a process that results from accumulation of nutrients in water bodies. It is a natural process, but can be greatly accelerated by human activities that increase the rate at which nutrients enter the water. Eutrophic waters are characterized by high nutrient concentrations, resulting in high productivity of plant growth. Slightly or moderately eutrophic water can support a complex web of plant and animal life. Waters with extreme nutrient concentrations are called hypereutrophic, and oligotrophic waters are characterized by extremely low nutrient concentrations. The trophic status of water bodies relies heavily upon the amount of available phosphorus and nitrogen. The concentrations of these nutrients are often highest during storm events soon after fertilizers are applied upstream.

Nitrates and phosphates are nutrients that come from both natural sources and human activities. These nutrients determine the productivity of a water body, and are needed at some level to provide good aquatic habitat. However, pollution from manure, fertilizer, and wastewater can cause excessive nutrient levels. Too much nitrate or phosphate causes algae to grow out of control, reducing light and oxygen for fish. Phosphorus is a nutrient required by all organisms for the basic processes of life. It is a natural element found in rocks, soils, and organic material. Phosphorus clings tightly to soil particles and is used by plants, so its concentration in clean waters is generally low. However, phosphorus is used extensively in fertilizer and other chemicals, so it can be found in higher concentrations in areas of human activity. Fertilizers generally contain phosphorus in the form of orthophosphate. Phosphate is not very mobile in soil so it tends to remain attached to solid particles rather than dissolving in water. However, if too much fertilizer is applied, the phosphates are carried into surface waters with storm runoff. Soil erosion of fertilized fields and lawns can also carry a considerable amount of particulate phosphate to streams. Many seemingly harmless activities added together fan cause phosphorus overloads. In freshwater lakes, phosphorus is often found to be the growth-limiting nutrient, because it occurs in the least amount relative to the needs of plants. If excessive amounts of phosphorus and nitrogen are added to the water, algae and aquatic plants can be produced in large quantities. When these algae die, bacteria decompose them, and use up oxygen. High phosphorus values generally reflect high algae or chlorophyll a values. In severe cases, dissolved oxygen concentrations can drop too low for fish to breathe, leading to fish kills. The loss of oxygen in the bottom waters can free phosphorus previously trapped in the sediments, further increasing the available phosphorus. Development can cause soil erosion, which will release phosphorus. If wetlands are drained for development, phosphorus that was buried can be exposed. During the building phase, and after everything has stabilized, phosphorus concentrations in stormwater can increase because natural filters such as trees, shrubs, and puddles have been eliminated.

Phosphorus exists in water in either a particulate phase or a dissolved phase. Particulate matter includes living and dead plankton, precipitates of phosphorus, phosphorus absorbed to

particulates, and amorphous phosphorus. The dissolved phase includes inorganic phosphorus and organic phosphorus. Total phosphorus is a measure of all the forms of phosphorus, dissolved or particulate, that are found in a sample. Orthophosphate is the filterable fraction of phosphorus, the form directly taken up by plant cells. This type is sometimes referred to as "reactive phosphorus." It is the most stable kind of phosphate, and is the form used by plants. It is produced by natural processes and is found in sewage. High levels of phosphate, along with nitrate, can overstimulate the growth of aquatic plants and algae, resulting in high dissolved oxygen consumption, causing death of fish and other aquatic organisms. The primary sources of phosphates to surface water are detergents, fertilizers, and natural mineral deposits.

Nitrogen is required by all organisms for the basic processes of life to make proteins, to grow, and to reproduce. Nitrogen is very common and found in many forms in the environment. Inorganic forms include nitrate, nitrite, ammonia, and nitrogen gas. Natural levels of nitrate in the soil come from decaying plants and animals, and natural levels in surface water can come from precipitation and runoff. Excessive concentrations of nitrate, nitrite, or ammonia can be harmful to humans and wildlife. High levels of nitrate, along with phosphate, can overstimulate the growth of aquatic plants and algae, resulting in high dissolved oxygen consumption, causing death of fish and other aquatic organisms. Nitrate, nitrite, and ammonia enter waterways from lawn fertilizer runoff, leaking septic tanks, animal wastes, industrial wastewaters, sanitary landfills and discharges from car exhausts. Fertilizer is a major influence on nitrogen concentrations in the environment. Commercial and organic nitrogen fertilizers are applied as ammonia or nitrate. Ammonia is then converted to nitrate in the soil. Nitrate that is not used by plants washes from farmlands and residential and commercial lawns into storm drains and nearby streams, or seeps into groundwater. Nitrate is highly soluble in water and is stable over a wide range of environmental conditions. It is easily transported in streams and groundwater. Nitrates feed plankton, aquatic plants, and algae, which are then eaten by fish. Nitrite is relatively short-lived in water because it is quickly converted to nitrate by bacteria. When plants and animals die, proteins are broken down by bacteria to form ammonia. Ammonia is then broken down by other bacteria to form nitrite, which is then broken down by another type of bacteria to form nitrate. This conversion of ammonia to nitrate and nitrite is called nitrification.

Ammonia is an inorganic form of nitrogen and is the least stable form of nitrogen in water. Ammonia is easily transformed to nitrate in waters that contain oxygen and can be transformed to nitrogen gas in waters that are low in oxygen. Ammonia is found in water in two forms; the ammonium ion and dissolved unionized ammonia gas. Total ammonia is the sum of these two forms. The dominant form depends on the pH and temperature of the water. High ammonia concentrations can affect hatching and growth rates of fish.

Lead is an element, one of the basic chemical building blocks of nature. Lead occurs naturally in harmless trace amounts in soil, rocks and water. Research suggests that some of the primary sources of lead exposure are deteriorating lead-based paint, lead contaminated dust, and lead contaminated residential soil. The soil can become contaminated from leaded gasoline and industrial processes. Battery plants and automobiles have released dangerous does of emissions into the air and soil in the past. Traces of lead from these sources remain particularly in urban areas. Although lead free alternatives are now being used, lead fishing sinkers are still in use. Sinkers can cause lead contamination in lakes and other bodies of water. Naturally

occurring pure copper is found in nature mixed with other elements in a number of compounds, many distinguished by their blue-green color. The primary source of copper is the leaching of copper from the household piping used to convey the water throughout the home.

Methods:

To establish a baseline assessment Balzer and Associates Inc. will perform field samples of the pond water at four stations (see map of pond denoting sampling stations). The locations of water quality sampling have been set, in collaboration with the Office of Water Quality, to assure that the data is not skewed in any way by location. Sampling will be taken in open water, away from the shoreline, in each respective quadrant of the pond. Balzer and Associates, Inc. will conduct on-site tests for pH, dissolved oxygen, conductivity, Secchi disk depth, and temperature. The other parameter samples will be taken and immediately delivered to Air Water and Soil Laboratories, Inc. for testing. All test results will be delivered to the Chesterfield Office of Water Quality within seven days of sampling. Baseline testing will be done once every two weeks before commencement of construction.

Once construction has begun Balzer and Associates, Inc. will perform field samples of the pond water at the four designated stations. Balzer and Associates, Inc. will conduct on-site analysis of the five mentioned parameters, and take water samples to be delivered to the laboratory for the other thirteen parameters. Sampling will be done one time each month during the growing season (May-October). Samples will be taken once every three months from November to April.

At the completion of the construction phase (all construction has been completed and all land disturbance permits and bonds have been released from Chesterfield County), Balzer and Associates, Inc. will continue to perform field samples of the pond water at the four designated stations once every three months for the next two years. Balzer and Associates, Inc. will conduct on-site analysis of the five mentioned parameters, and take water samples to be delivered to the laboratory for the other thirteen parameters.

Samples for the other thirteen parameters will be taken to Air Water and Soil Laboratories, Inc. for further analysis. Appropriate pre-labeled containers for each parameter will be used and provided by Air Water and Soil Laboratories, Inc. and care will be taken to adhere to analytical holding times for the specific parameters. Samples will be taken and immediately placed in a cooler on ice for transfer to the laboratory. The samples will be delivered to the laboratory on the same day they were taken. Air Water and Soil Laboratories, Inc will conduct analyses of the remaining thirteen parameters. Chain of custody forms supplied by Air Water and Soil Laboratories, Inc. will be completed prior to delivery to the laboratory and will be signed at sample transfer by each party. Copies will be copied and archived by Balzer and Associates, Inc. for documentation. Air Water and Soil Laboratories, Inc will provide the results of the laboratory analyses to the Chesterfield Office of Water Quality upon completion.

Equipment and instrumentation to be used are as follows: computer with Microsoft Excel software to document data, a boat will be provided by the Chester Fishing Club for pond

analysis, instrumentation provided by Encompass Environmental Supply and Rental Co., sampling containers provided by Air Water and Soil Laboratories, Inc., and a Secchi disk owned by Balzer and Associates, Inc. A price quote to do analyses from Air Water and Soil Laboratories, Inc. has been provided an included in the proposal (see Proposal from Air Water and Soil Laboratories, Inc.). Encompass Environmental Supply and Rental Co. has provided a price quote to use their instrument for sampling (See proposal from Encompass Environmental Supply and Rental Co.). Tascon Group, Inc. will be charged 95 dollars each day the instrument is rented. The instrument used will be a Horiba U-22 Meter. This instrument can test for a variety of parameters including pH, conductivity, dissolved oxygen, turbidity, salinity, and Total Dissolved Solids. A flow cell will be provided with the meter. Documentation and specifications of the instrument have been included (See Horiba U-20XD Series Specifications)

Discussion:

With the construction of the Tascon Condominium/Single Family development several permanent and temporary pollution, sediment and erosion control measures will be utilized. The construction plans will illustrate meeting all of the Virginia Department of Conservation and Recreation and Division of Soil and Water Conservation requirements for erosion and sediment control during the construction phase. Included in the plans are three temporary sediment traps, four temporoary sediment basins, super silt fence adjacent to the existing pond and outfall protection plus turbidity curtains at the outfall locations of all of the temporary sediment basins adjacent to the existing pond.

The referenced plans also illustrate several permanent pollution control measures that are designed to prevent polluted storm water runoff from entering the existing Chester Fishing Club pond. The existing five acre pond to the west of the Chester Fishing Club pond will be upgraded to a Best Management Practice (BMP) and Storm Water Quality pond (SWQ) as defined by the Virginia Stormwater Management Handbook. In addition to this BMP and manufactured BMP known as a Stormfilter will be built as well as two Stormceptor manufactures BMPs by Rinker will be built. All concentrated outfalls from the proposed development will flow through a BMP/SWM measure and then either flow into an energy dissipater and then into the existing pond or directly in to the existing pond. If this development causes degradation of water quality in the Chester Fishing Club pond, the developers shall provide the necessary remedy to the extent caused by the development. Any proposed remedy shall be reviewed and approved by the Chesterfield Office of Water Quality.

The residents of the community can also help limit pollution and the amounts of nutrients in stormwater runoff entering the pond. Residents can have their vehicles washed at commercial car washes rather than the driveway. Oil can be changed at designated professional locations in the area. Most importantly, the amount of fertilizer put down on yards can be limited. Limiting the rate at which fertilizer is used will reduce unnatural and excessive amounts of phosphorus and nitrogen entering the pond.

May 16, 2006

RE: Tascon- Magnolia Lakes
Chester, Virginia
Water Quality Proposal

Results:

After each set of data has been sampled and analyzed by Balzer and Associates, Inc. and Air Water and Soil Laboratories, Inc., the results will be delivered to Chesterfield Office of Water Quality for review and comment.

If you have any questions or comments, please do not hesitate to call the undersigned.

Sincerely,
BALZER AND ASSOCIATES, INC.

Patrick Weddel
Engineer Technician
501 Branchway Road
Richmond, VA 23236
Phone: (804) 794-0571
Fax: (804) 794-2635

06PRO403-1K

BALZER AND ASSOCIATES INC

REFLECTING TOMORROW

LIST OF PARAMETERS PERFORMED BY BALZER AND ASSOCIATES, INC.

- Temperature
- Dissolved Oxygen
- Conductivity
- Secchi Disk Depth
- pH

06PRO403-IL

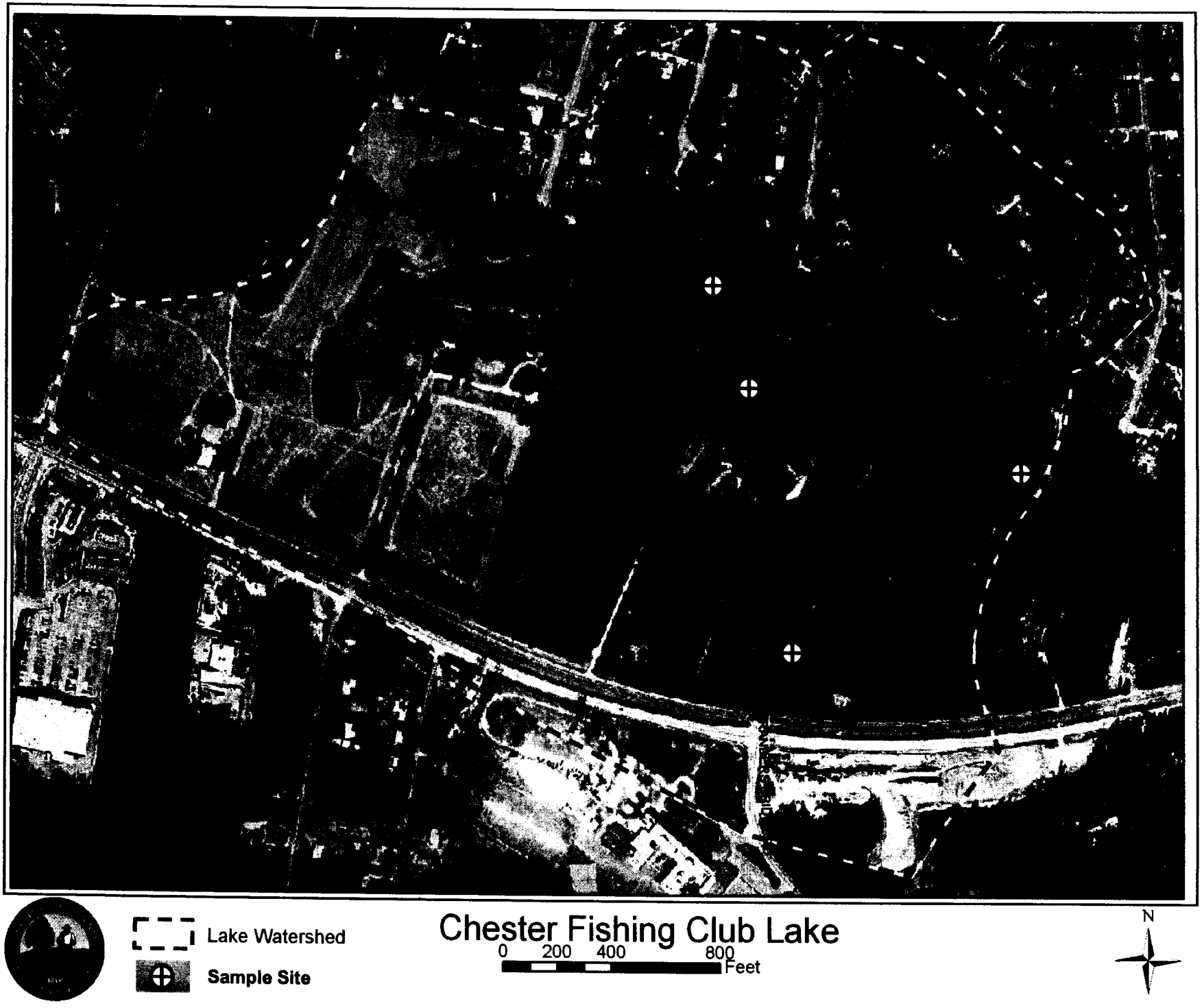
BALZER AND ASSOCIATES INC

REFLECTING TOMORROW

LIST OF PARAMETERS PERFORMED BY AIR WATER AND SOIL LABS, INC

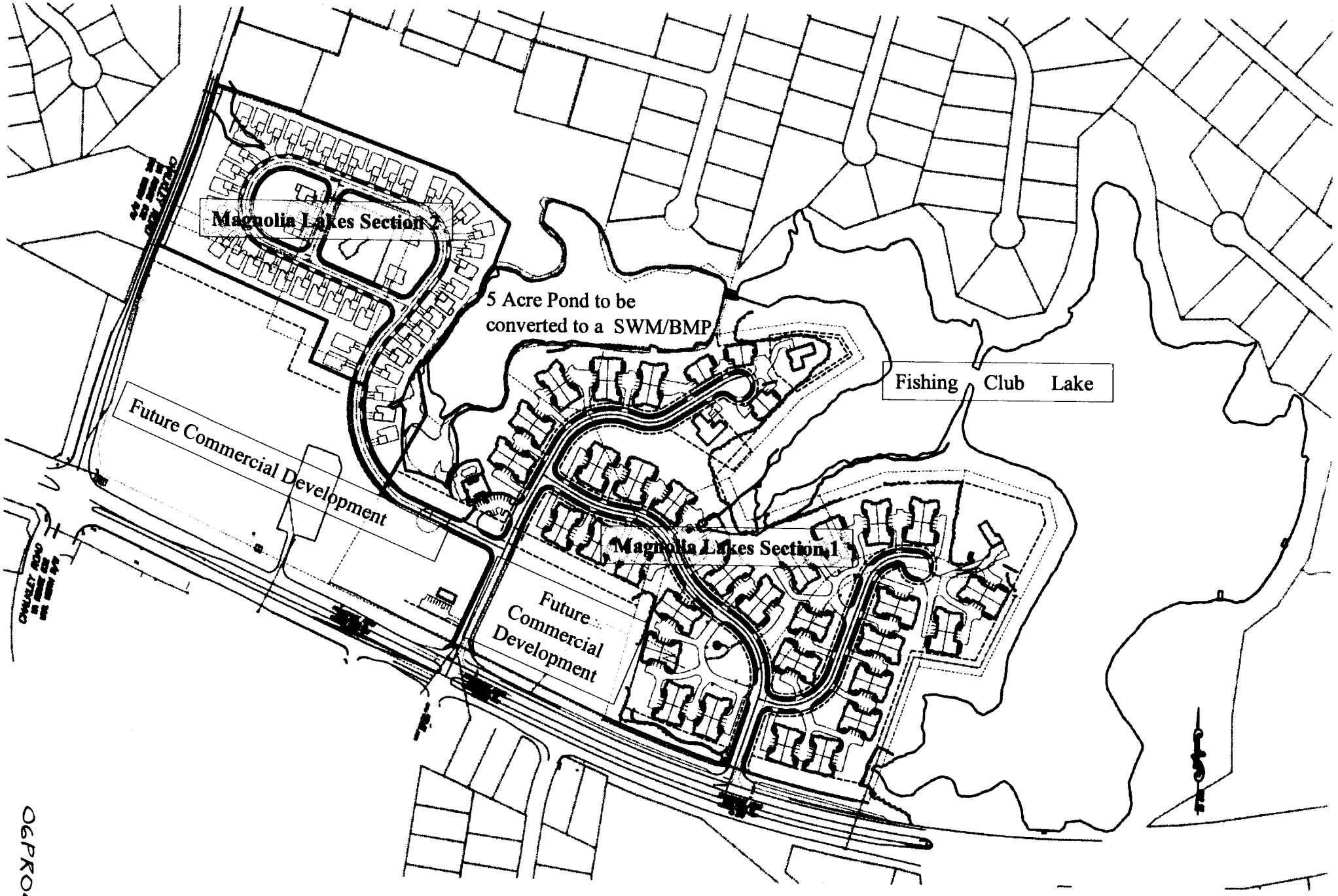
- Total Suspended Solids
- Turbidity
- Lead by ICP
- Copper by GFAA
- Nitrite
- Nitrate
- Alkalinity
- Ammonia
- TKN
- Phosphorus (Ortho and Total)
- Chlorophyll A
- Fecal Coliform (MPN)

06PR0403-IM



Attachment 2. Map depicting the watershed and approximate sample site locations for the water quality plan.

06PR0403-2



Tascon Magnolia Lakes Development

06PK0403-3

RE: 06PR0403
RE: Case 04SN0314 - Magnolia Lakes

Position Paper
Magnolia Lakes – Tascon Group

Submitted by: Chester Fishing Club, Inc

July 6, 2006

In the matter of the Water Quality Plan (WQP), submitted by the Tascon Group for the Magnolia Lakes project scheduled for review by the Chesterfield Board of Supervisors on July 18, 2006; **the Chester Fishing Club is strongly opposed to the Water Quality Plan as submitted.** The basis of our opposition is as follows:

- The initial plan, as presented to the Chester Fishing Club by the Tascon Group and Balzer and Associates, Inc., indicated that all of the rainwater run-off would be directed to a sediment pond owned by the Tascon Group (LaVern Cole's pond). In addition, we were assured that the rate of discharge would remain unchanged.
- The Project support from the Chester Fishing Club at the Zoning Hearing was based on no negative impact on our lake; and certainly no direct discharge of rainwater into the Chester Fishing Club's lake – with or without a filtering system. Had we known that our lake was going to be used as a retention basin by Tascon, we would have opposed the zoning case.
- We were assured many times that the rainwater run-off would not increase. Changing the watershed will have an impact on our lake. By Tascon's own calculations the water level will raise. The existing dam was at its absolute capacity during Hurricane Irene. Eyewitness accounts have reported some topping of the dam at that time.
    - **Any increased run-off would put the dam in danger of failure with potentially significant down-stream consequences. With this position paper, the Chester Fishing Club, Inc. is putting Chesterfield County and the Tascon Group on notice of these potentially significant safety issues.**
- Tascon has indicated a preference to install a lift station and transfer the run-off into the sediment pond on the property under development.
- Tascon has verbally indicated that they would install a generator at the pumping station to mitigate the county's concern for power outages when the pumping station is most needed.
- The Tascon Group's current plan, as explained to us, is to pipe the filtered water from Tascon's property under our land and into an underwater discharge outlet in our lake. In order to install a pipe on our land, it is our belief that the Tascon Group would need an

06PR0403-4A

easement from the Fishing Club. **The Chester Fishing Club may not grant such an easement.**

- An e-mail from Scott Dunn (Chesterfield County) on April 21, 2006 recommended the developer work the Chester Fishing Club on improving/modifying the lake outlet structure. This has not been discussed with us.

The position of the Chester Fishing Club, Inc. is total and complete opposition to the Water Quality Plan, if rainwater run-off is discharged into our lake without first being discharged into the Tascon Group's sediment pond.

If the Chester Fishing Club's position is not upheld, we recommend a modification to the current Water Quality Plan.

> To ensure the long term water quality of the Chester Fishing Club's lake the Water Quality Plan for the Magnolia Lakes project be modified to append the requirement for quarterly water quality sampling for twenty (20) years.

Even with this addition, the issue of an easement remains.

This Position Paper is respectively submitted.

Gary R. Ellenberger

Gary R. Ellenberger
President
Chester Fishing Club, Inc

3. Utilities. Public water and wastewater shall be used. (U)

4. Timbering. Except for timbering approved by the Virginia State Department of Forestry for the purpose of removing dead or diseased trees, there shall be no timbering on the Property until a land disturbance permit has been obtained from the Environmental Engineering Department and the approved devices installed. (EE)

* 5. Drainage and Water Quality.

a. A water quality plan, including an assessment of baseline conditions, for protection and monitoring of the water quality of the Chester Fishing Club pond and agreeable to the Chester Fishing Club, that is approved by the Office of Water Quality shall be submitted to the Planning Commission for review and approval prior to or in conjunction with any site plan and/or subdivision plan approval. The intent of the plan is to preserve the existing water quality of the Chester Fishing Club pond. (OWQ)

b. If this development causes degradation of water quality in the Chester Fishing Club pond, the developers shall provide the necessary remedy to the extent caused by development. The proposed remedy shall be reviewed and approved by the Office of Water Quality.

c. The lake in the Ironbridge development was designed using runoff from this project site based on residential development. An analysis must be made of the impact that increased runoff from this project will have on the Ironbridge pond flood levels. If detention is utilized, the maximum permissible release rate for the proposed detention basin shall be such that the capacity of the existing facilities downstream shall not be exceeded and the recorded 100-year flood plain/backwater shall not be increased.

d. The existing on-site 5± acre lake must be refurbished to provide a principal spillway capable of conveying the post-development 10-year runoff and an emergency spillway which will pass the 100-year storm or to that performance criteria, approved by the Engineering Department which will contribute to the desired performance of the Chester Fishing Club lake spillway system. The work must be completed before any occupancy permit will be issued.

e. The existing lake owned by Chester Fishing Club must be analyzed for any adverse hydrological impact as a result of the new development. The cost of all hydraulic improvements shown to be necessary by the analysis shall be borne by the applicant. The improvements shall be made in accordance with a plan that schedules improvements to be made at such time to prevent the increasing runoff from exceeding the dam's hydraulic capacity.

* CONDITION 5. CASE 04SN0314